

Clouds and Arrows: Visualizing the Dynamics of Transformation

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SHORTLY AFTER General Peter J. Schoomaker became the Chief of Staff of the Army, he spoke to U.S. Army Command and General Staff College (CGSC) students about his vision for transforming the Army. Schoomaker emphasized that “getting it right” was a tough and complex job. To illustrate the point, he used an uncomplicated graphic symbol to show what “right” would look like—a simple arrow pointing to the right—toward the future—on his timeline of change. This, he said, was the desired direction of transformation.

A horizontal arrow represented a balanced change that reconciled the Army’s current operational needs with the requirement to address future challenges and threats. The horizontal direction was important. The Army could “get it wrong” by fixating on urgent problems in Afghanistan and Iraq and finding itself unprepared to handle the competitors that exist over the time horizon. Schoomaker depicted this flawed emphasis with an arrow pointing down at a 45-degree angle. If transformation was oriented exclusively on nebulous, hypothetical, future threats, it would again be misdirected, as illustrated by an arrow pointing up at a 45-degree angle.

Schoomaker’s horizontal arrow was a simple, but not simplistic, demonstration of the power of graphic models. Everyone could visualize the critical balance needed for a successful transformation. The illustration was a powerful but easily grasped representation of a complex idea. The simple “arrow of transformation” contrasted sharply with the annoying, multi-vectored PowerPoint® extravaganzas Army staffers often use. The arrow did not obfuscate issues; it captured the essence of Schoomaker’s argument. Even so, those who study and teach history tend to be suspicious of such models—and for good reason. All too often, harried staff officers (as well as social scientists)

use such models to place historical data into dubious frameworks to support questionable theories. Well-conceived models, however, do have a place in the study of history, especially when they help us understand the complexity of human experience. Prussian theorist Carl von Clausewitz’s famous paradoxical trinity is a case in point.

Clausewitz’s depiction of the relationship of state policy, public opinion, and battlefield uncertainty as three magnets suspended in space is another simple model (figure 1). Thousands of post-Vietnam era CGSC and Army War College students have had this trinitarian model drilled into them. Today, virtually every officer is familiar with the model, and the Clausewitzian trinity serves as a reference point for much of our professional discussion.

Military Transformation

In this article, I depict military transformation and adaptation in a model that is neither predictive nor prescriptive. My modest goal is to help readers develop an organized way of thinking about how to change military institutions to handle new environments. My

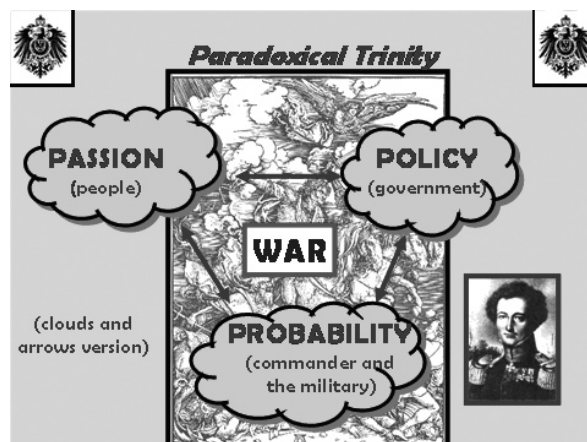


Figure 1. Clausewitz’s paradoxical trinity.

model is built on history and has evolved from years of student corrections to my inadequate attempts to explain Army transformations in CGSC classrooms.

The U-boat threat as example. Inspiration for the model came from studying the problems Great Britain faced in combating the German U-boat threat in the North Atlantic during World War II. In the summer of 1940, Great Britain faced economic strangulation; the weapons, doctrine, and resources of the Royal Navy and Royal Air Force were inadequate to guard the merchant shipping essential to the British war effort. By late 1940, German U-boats were sinking Allied merchant ships at a rate that made it impossible to sustain industry and feed the population. Operating in wolf packs that rode the surface at night, the German U-boat fleet avoided discovery by underwater detection technology and limited its vulnerability to Allied aircraft. The escorts for Allied convoys were not equal to the German challenge.¹

Of course, the British were not helpless. They had a variety of possible countermeasures such as increasing the number of escort vessels allocated to convoy duty, using new technology to detect U-boats on the surface at night, and changing anti-submarine tactics within convoys. We can group these countermeasures into three categories:

- Conceptual (new doctrine, organization).
- Technological (new devices such as shortwave radar or searchlights on supporting aircraft).
- Logistical (additional resources such as more escort vessels and antisubmarine aircraft).

The list does not convey the interrelationship of the three elements. For example, the technological solution the British sought through the use of short-wave radar would not solve the wolf-pack problem unless enough systems were built and installed in antisubmarine warfare (ASW) aircraft to make a difference. Without an Allied logistical or financial commitment to greater resourcing, the technological solution was inadequate. Similarly, the appearance of shortwave radar in convoy battles demanded a change in ASW tactics and a change in thinking to exploit the new equipment's potential.

A triangular relationship—the “trinity of transformation”—exists among the three categories. The arrows in figure 2 depict the effect the categories have on each other and imply that a change in one will suggest changes in the other two. To explore the relationship of the elements of this trinity, we

should consider other historical examples.

Prewar doctrine. The way the U.S. Army Air Force (USAAF) overcame difficulties early in the combined bomber offensive of World War II is illustrative of adaptation and transformation under stress.² The USAAF's prewar doctrine led it to attempt to cripple the Luftwaffe and the German war effort by conducting unescorted, daylight bombing raids against key chokepoints in German aircraft production. The Germans resisted tenaciously during the first 2 years of the campaign, and by late 1943, increasing 8th Air Force bomber losses forced the commander, General Ira Eaker, to reconsider prewar doctrine.

We can identify three possible solutions to the 8th AAF's problem. By increasing the number of bombers, the USAAF could have chosen to stubbornly ignore the heavy losses and attempted to overcome the Luftwaffe through attrition and the sheer weight of numbers. This option promised a long, bloody campaign with an uncertain result and was only acceptable if USAAF leaders could show that the Luftwaffe was suffering unsustainable losses. For some time, by choosing to believe exaggerated reports of the losses inflicted on German interceptors, Eaker and his subordinates seemed willing to accept such a course of action, but it was an ugly option, by any standard. A second solution was conceptual: The USAAF could change its doctrine and objectives. The Royal Air Force had already abandoned its prewar doctrine of daylight, precision bombing. However, the USAAF saw giving up its doctrine as a defeat and renunciation of the concept most likely to justify an independent U.S. Air Force. A third purely

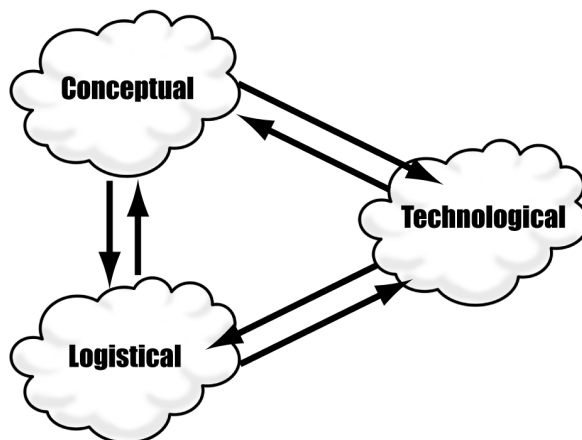


Figure 2. The trinity of transformation.

technological solution would have been to increase the defensive armament of the bombers. Experiments in this direction had failed, however.

The solution to the 8th AAF's problem turned out to be the use of long-range fighters—the P-47 Thunderbolt and the P-51 Mustang—equipped with drop tanks, a solution that encompassed all three elements of the adaptive trinity. The technological aspect was the drop tank. U.S. aviators in New Guinea had begun to improvise drop tanks as early as 1942. The P-51, upgraded with a superior British Merlin engine, was available by the summer of 1942. However, until USAAF leaders called for the production of the Mustang and the drop tank, conceptual and technological adaptations were insufficient to solve the USAAF's problem. Production priority and technological adaptation had to be spurred by a conceptual revolution. The USAAF had to abandon its faith in unescorted bomber tactics and renounce the gospel that had guided it between the wars. Once all three elements were in place, resources for research and development (R&D) and production gave the Allies the tools with which to break the back of German air power. In early 1944, Operation Pointblank, featuring P-47s and P-51s flying deep into German airspace, inflicted devastating losses on the Luftwaffe, finally achieving Allied air superiority over the Third Reich.

The Warsaw Pact. We can see the interrelationship of the conceptual, technological, and logistical aspects of adaptation in a peacetime example as well. After the Vietnam War, the U.S. Army faced the problem of deterring aggression from the increasingly powerful Warsaw Pact. The 1973 Arab-Israeli War saw massive improvement in Soviet capabilities (such as the BMP fighting vehicle, the AT-3 Suitcase Sagger antitank guided missile, and the SA-3 antiaircraft system). These technological upgrades, coupled with the reinforcement of Soviet forces in East Germany, challenged NATO's ability to repulse a conventional Soviet assault on Western Europe. Many in the defense establishment believed the Soviets had "stolen a march" in the conventional arms race.³

The commander of the newly created U.S. Army Training and Doctrine Command (TRADOC), General William E. DePuy, used doctrine as the primary lever to energize the changes the Army needed. He pushed an accelerated program to generate a doctrine of active defense that called for U.S. forces to move nimbly across the battlefield to counter Soviet breakthroughs.

The problem was the U.S. Army's main battle tank (M-60), attack helicopter (AH-1), and armored personnel carrier (M113) did not satisfy the new doctrine's mobility requirements. Using computer models and scenarios taken from U.S. sectors of West Germany, TRADOC showed that new weapons systems were necessary to stop hypothetical Red hordes. Using these data, the Army went to Congress to request funds to develop and produce a new tank, a new infantry fighting vehicle, a mobile rocket system, and a new attack helicopter.⁴

The Threat

DePuy used a conceptual impetus to get the technology and resources to meet the threat posed by the Warsaw Pact. However, military leaders rarely achieve such a happy balance of conceptual, technological, and logistical solutions to a peacetime security dilemma. Threat—the perception of enemy strength, capabilities, and hostile intentions—is key to establishing the relationships among the three elements of the adaptive trinity. Thus, a revised model might put "threat" in the middle of the model as the essential axis of adaptation (figure 3). According to this version of the model, all a military or political leader would need would be an accurate assessment of the enemy in order to establish the proper relationship of conceptual, technological, and logistical solutions to the adaptation problem. Pretty simple, it seems. Unfortunately, the reality is not so simple. In the first place, one is not always sure who the enemy will be. For example, before World War I, the U.S. Army could not convince its civilian masters that there was a serious threat on

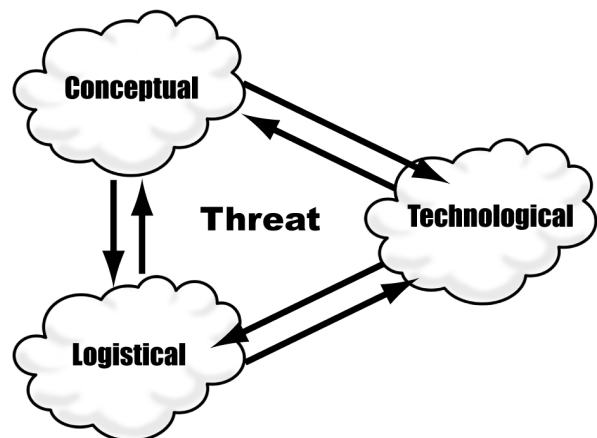


Figure 3. Threat is at the hub of transformation.

the horizon. The constabulary missions in the Old West and the Philippines were essentially over, and the Army was conceptually muddled, technologically backward, and financially strapped. Military efficiency was sacrificed to an austerity imposed by the civilian leadership of Congress.

The situation the U.S. Army faced during the 1930s suggests that threat is the centerpiece of the adaptive trinity only when it is seen as real, immediate, and dangerous. Otherwise, other factors, especially domestic politics, will displace threat and act as the pivotal factor in the relationship of the three modes of the trinity (figure 4). Thus, even though the Army could see Japan and Nazi Germany as future enemies, the reality of the Great Depression meant military budgets remained austere. Then, from 1939 to 1940, Germany's lightning victories over Poland and France changed the equation. Threat became too pressing to be ignored and regained its rightful role as the hub of our model.

Just as the Depression limited the U.S. Army's modernization, it also undermined Great Britain's early lead in the conceptual and technological development of mechanized forces during the 1930s. In the Soviet Union, revolutionary developments in the conceptualization of mechanized warfare seemed to indicate a more favorable relationship between political considerations and the Soviet conception of the foreign threat. Soviet leader Joseph Stalin's emphasis on heavy industry, along with his paranoid fear of "capitalist aggression," seemed to support the evolution of a highly modernized Red Army—until Stalin's paranoia caused him to turn against his own officer corps. The catastrophes the Germans inflicted on the Soviet military in 1941 indicate the

disastrous consequences of Stalin's purges. The significant technological developments and enormous resources available to the Red Army in the years before the war were not enough to overcome doctrinal disarray and confusion in force structure, which plagued Stalin's army when politics displaced threat assessment as the hub of adaptation.

Military Culture

As I attempted to explain the model to a CGSC class, a fighter pilot said, "I don't care how many F-16s we send to [a third-world country]; they will never have a decent air force." His point was that without the values of a modern Western military, no panoply of expensive hardware, no outpouring of wealth, not even an imminent hostile presence can lead to successful adaptation. He suggested a third factor for the model—military culture. Along with politics, military culture is a force that tends to drive threat out of the trinity of adaptation (figure 5).

From June 1940 to October 1941, German U-boat forces enjoyed their first "happy time" when British merchant shipping losses skyrocketed. Desperate for air cover over its beleaguered convoys, the Royal Navy called on the RAF to increase air support to the antisubmarine effort. The RAF was slow to respond. Consumed with building up the strategic bombing offensive against Germany, RAF bomber barons were reluctant to release assets for convoy protection. Even though failure in the Battle of the Atlantic threatened to strangle the British economy, the disagreement between the RAF and the navy was not easily resolved. The RAF's service-specific agenda prevented a rational response to an urgent strategic reality.

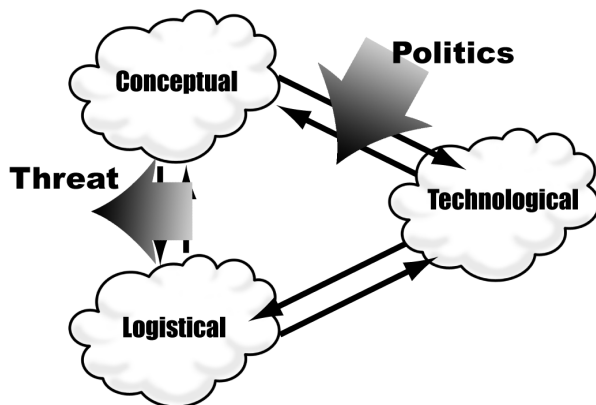


Figure 4. Politics displaces threat as a spur to action.

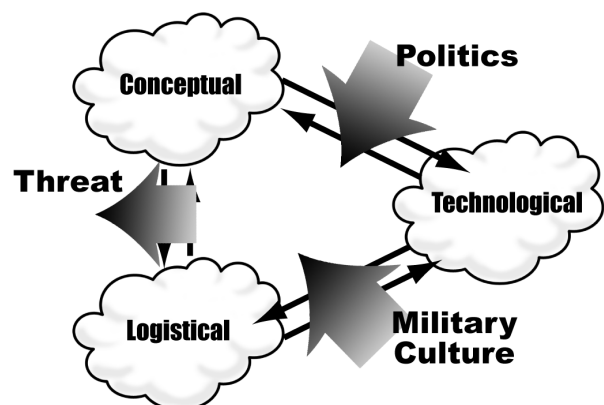


Figure 5. Military culture influences transformation.

Before World War II, the USAAF was wed to a doctrine of strategic bombing that was likely to win it the autonomy it cherished. The doctrine focused on the four-engine, long-range bomber to the near-exclusion of all others. Military culture, expressed as the desire for eventual independence from the Army, drove the USAAF to place special emphasis on strategic bombing. This led to an R&D effort that gave us the B-17, B-24, and B-26. Relatively little attention, research, or resources were devoted to ground-attack and interception missions. Thus, the USAAF entered the war with a profoundly unbalanced fleet. Even the successes of the Luftwaffe in the early years of the war failed to shake the air pioneers' faith in the strategic mission.

Military Adaptation

The current model of military adaptation shows the three factors balanced around a triangular hub where threat, politics, and military culture compete for a central position (figure 6). However, a static, two-dimensional model on the flat surface of a printed page fails to do justice to the dynamic interaction of vectors in constant flux. A three-dimensional model akin to a child's mobile would better depict the roles of these three factors.

The model also fails to depict the relative weight of the three components of adaptation. The U.S. Army believed doctrine drives change and thus placed the conceptual factor at the top of the trinity, but one can find numerous examples in history when new weapons or resource limitations determined how warfighting institutions changed. Clearly, then, the model bears further refinement. However, we can use the model to analyze the Army's current efforts at transformation. The war in Iraq consumes the Army's attention and resources even as it prepares for all 21st-century threats. Money that would have been used for developing the Future Combat Force must be diverted to buy armor for HMMWVs. Can the Army afford to prepare itself for out-year threats when it is so clearly stressed by the current conflict? Are the nodes of adaptation properly focused and in balance? Which threat will drive our efforts at transformation?

Our earlier examples suggest that without a clearly articulated threat, or in the absence of a clear threat, military culture and political considerations will compete to displace the threat as the controlling focus of adaptation. Clearly, the U.S. military has

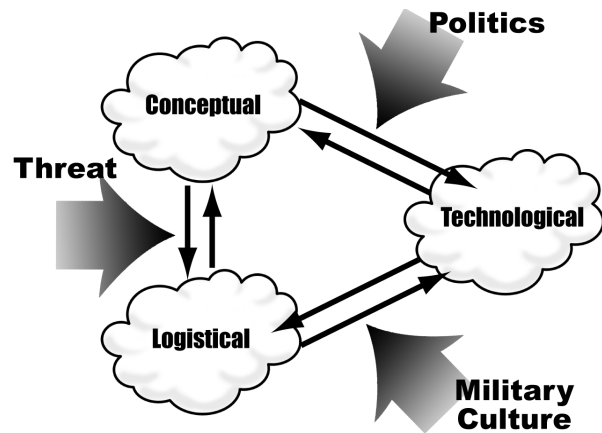


Figure 6. Transformation's three factors and three forces for change.

plenty of near-term threats to occupy its attention. But should these be the focus of Army Transformation? We have tried to answer the question with a fuzzy construct called the contemporary operational environment, but is this a successful focus for transformation? If not, then we need to do a considerable amount of soul-searching to ensure military culture and political considerations do not make transformation dysfunctional. Perhaps the model presented here will help in the necessary self-analysis and offer a simple method of visualizing the elements of adaptation and transformation. Admittedly, the model could bear more development. Perhaps, it might be seen as "rock soup" for those who seek a more mature representation of the problems of military adaptation; on the other hand, it might encourage such people to develop a better one. **MR**

NOTES

1. The discussion of the campaign in the Atlantic is from Stephen Roskill, "Battle of the Atlantic" in *Decisive Battles of the Twentieth Century: Land, Sea, Air*, eds., Noble Frankland and Christopher Dowling (New York: David McKay Publishers, 1976), 81-100.

2. The discussion of the Allied Bomber Offensive is chiefly from William R. Emerson, "Operation POINTBLANK: A Tale of Bombers and Fighters" in *The Harmon Memorial Lectures in Military History, 1959-1987* (U.S. Air Force Academy, CO: Office of U.S. Air Force History, 1988), 441-72.

3. The discussion of post-Vietnam Army reform is from Paul H. Herbert, *Deciding What Has to Be Done: General William E. DePuy and the 1976 Edition of FM 100-5, Operations* (Fort Leavenworth, KS: Combat Studies Institute, 1988), 1-37.

4. Ibid.

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